

Northern Neck Regional Hazard Mitigation Plan

APPENDIX A – Sample Resolution

The following resolution can be used by local jurisdictions to adopt the regional hazard Mitigation Plan per FEMA requirements.

MODEL RESOLUTION ADOPTING A NATURAL HAZARDS MITIGATION PLAN FOR NORTHERN NECK PLANNING DISTRICT COMMUNITIES:

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt natural hazard mitigation plans in order to receive certain federal assistance, and

WHEREAS, a Mitigation Advisory Committee (“MAC”) comprised of representatives from counties of Lancaster, Northumberland, Richmond, and Westmoreland; and the towns of Colonial Beach, Irvington, Kilmarnock, Montross, Warsaw, and White Stone was convened in order to study the Northern Neck Region’s risks from and vulnerabilities to natural hazards, and to make recommendations on mitigating the effects of such hazards on the Northern Neck Region; and

WHEREAS, a request for proposals was issued to hire an experienced consulting firm to work with the MAC to develop a comprehensive natural hazard mitigation plan for the Northern Neck Planning District; and

WHEREAS, the efforts of the MAC members and the consulting firm of Dewberry, in consultation with members of the public, private and non-profit sectors, have resulted in the development of a Hazard Mitigation Plan for the Northern Neck Planning District including (County name).

NOW THEREFORE, BE IT RESOLVED by the (County Board of Supervisor’s name) that the portions of the Hazard Mitigation Plan dated () applicable to (County name) is hereby approved and adopted for the (County name). A copy of the plan is attached to this resolution.

ADOPTED by the (County) this ____ day of _____, 2005.

APPROVED:

(Chairman, Board of Supervisors)

ATTEST:

(Clerk of the County)

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APPENDIX B – Local Plan Review

Jurisdiction	Plan Name	Date Adopted	Excerpts/Details of Document	Effect?
Lancaster County	<i>Land Development Code</i>	July 30, 1993	<p>Part I. Zoning Ordinance</p> <p>Article 3. Agricultural, Limited, District A-1 Statement of Intent: This district covers portions of the county which are occupied by various open uses, such as forests, parks, farms, lakes, or marshlands and wetlands subject to the county wetlands commission. This district is established for the specific purpose of providing for safe and orderly shoreland development, facilitating existing and future farming operations, conservation of water and other natural resources, reducing soil erosion, protecting watersheds, and reducing hazards from flood and fire.</p> <p>Article 4. Agricultural, General, District A-2 Statement of Intent: This district covers portions of the county which are occupied by various open uses, such as forests, parks, or farms. This district is established for the specific purpose of providing for safe and orderly shoreland development, facilitating existing and future farming operations, conservation of water and other natural resources, reducing soil erosion, protecting watersheds, and reducing hazards from flood and fire.</p> <p>Article 10. Historic Resources 10-6. Review of alteration, restoration and rehabilitation of</p>	

¹ Excerpted from Lancaster County Comprehensive Plan.

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			<p>properties with historic overlay zoning. Prior to any substantial alteration to a property with historic overlay zoning in Lancaster County, the HRC must certify that the proposed alteration is historically, architecturally and archaeologically appropriate to the property in question. This commission concurrence will be issued as a certificate of appropriateness.</p> <p>Article 13. General Provisions 13-8. Building site. To insure that the purchaser will have sufficient land, upon which to build a house or other structure flood free, as required in the federal flood insurance program adopted by the board of supervisors on November 27, 1973, the zoning administrator may require the developer and/or seller of the land to provide elevation and flood profiles sufficient to demonstrate the land and site to be completely free of the danger of floodwaters.</p> <p>Article 18. Waterfront Overlay Zone¹</p> <ul style="list-style-type: none"> • Regulates all residential parcels recorded on or after May 11, 1998 that are within 800 feet of tidal waters and wetlands. • Requires 2 acre minimum lot size, buffers and other lot size/design requirements. <p>Article 23. Floodplain Overlay District (enacted 8-26-93) 23-1. General provisions. (c) <i>Applicability.</i> These</p>	

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			<p>provisions shall apply to all lands within the jurisdiction of Lancaster County, Virginia, and identified as being in the 100-year floodplain by the Federal Insurance Administration.</p> <ul style="list-style-type: none"> • Overlay concept employed – underlying zoning remains in effect. • Include provisions for the coastal high hazard area including 100 foot setback from reach of mean high tide; and design standards. • Sets criteria for consideration of variances. • Sets procedures for existing structures. <p><i>Part II. Subdivision Ordinance*</i></p> <p>Section 5. General Regulations</p> <p>5-1. Mutual responsibility and suitability of land.</p> <p>(a) There is mutual responsibility between the subdivider and the agent and board of supervisors to divide the land so as to improve the general use pattern for the land being subdivided. Furthermore, a subdivision shall not be approved if it contains lots which are not suitable for development for one or more of the following reasons as such subdivision may endanger the health, safety, property, and welfare of the persons building and utilizing the lot or other properties....:</p> <p>(2) Wetlands, areas with poor drainage or hydric soils, floodplain, and other areas that are periodically inundated with water, and as established by the 10-year floodplain.</p> <p>(c) Wetlands as defined in the Virginia Wetlands Zoning</p>	

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			<p>Act, or any land subject to periodic flooding, including land subject to flooding that is identified by county, state or federal agency flood hazard maps or studies, shall not be subdivided in such a way as might increase danger to health, life or property of citizens of the county or aggravate erosion or the flood hazard.</p> <p>5-3. Septic systems. The agent or board of supervisors shall not approve any plan of subdivision which includes any sanitation device or system or its 100 percent reserve site constructed within the ten year floodplain.</p> <p>5-24. Underground utilities. Where new electrical and telephone lines are required for internal service to a subdivision, such lines shall, where feasible, be placed underground. The agent and board of supervisors may waive this requirement if advised in writing by the utility company.</p> <p>5-25. Areas of major erosion. In areas of significant erosive activity along banks or shorelines, the agent and board of supervisors shall require the subdivider to not only file a plan for erosion and sedimentation control, but also to execute a plan of stabilization as a part of those site improvements covered by bond.</p>	
Lancaster County	<i>Code of Ordinances</i>	October 28, 1993	<p>Chapter 26. Environment Article II. Coastal Primary Sand Dune Regulations</p> <ul style="list-style-type: none"> • Defines permitted uses. • Describes permitting requirements and procedure 	

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Lancaster County	Lancaster County, Virginia Comprehensive Plan	December 28, 2000	<p><i>Chapter 2 – Lancaster County Suitability of Land for Development Study</i></p> <p>Goals and Objectives</p> <p>Goal #1: Encourage new and orderly development in areas of the County most suitable for new growth.</p> <p>Objective: Explore zoning incentives and ordinance amendments which help direct new development to areas of the County most suitable for growth.</p> <p>Objective: Explore possible amendments to the zoning ordinance that would protect property owners from potential hazards of shrink-swell soils and high water tables.</p> <ul style="list-style-type: none"> Plan recommends that County develop countywide parcel specific database highlighting physical constraints of each parcel – floodplains and other natural hazards should be included. <p><i>Chapter 4 – Lancaster County Shoreline Protection Study and Plan</i></p> <ul style="list-style-type: none"> Plan recommends that alternative measures, such as vegetative or porous rip-rap methods, for shoreline protection be promoted in the County. <p>Goal #1: Actively encourage shoreline protection measures which are equal to the erosion potential at a particular site.</p> <p>Objective: Encourage alternative shoreline protection methods such as fringe marsh establishment in shoreline areas with less wave energy, light boat traffic, and small</p>	

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			<p>fetches.</p> <p>Objective: Discourage use of bulkheads and rip-rap in low energy, lightly traveled water bodies; unless erosion justifies shoreline hardening for protection purposes.</p> <p>Objective: Encourage use of revetments instead of bulkheads in high energy shoreline zones...</p> <p>Goal #3: Encourage coordinated shoreline protection efforts in existing waterfront communities and in new subdivisions.</p> <p>Objective: Propose changes to the Subdivision Ordinance that would encourage submission of a shoreline management plan.</p> <p>Objective: Propose changes to the Subdivision Ordinance which would offer incentives such as density credits to developers who initiate appropriate, coordinated, on-site shoreline protective measures.</p> <p>Objective: Encourage waterfront property owners in existing communities to consider multi-parcel shoreline protection strategies before they pursue individual approaches.</p> <p><i>Chapter 5 – Access to State Waters</i></p> <p>Goal #1: Provide and encourage adequate recreational access to State water while assuring continued protection of the natural environment.</p> <p><i>Chapter 7 – Economy and Existing Commercial/Industrial Land Use</i></p>	

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			<p>Goal: Expand and diversify the economy within the county.</p> <p>Objective #3: Ensure that proper and sufficient zoning and land use measures are in place to allow for responsible commercial and industrial growth.</p> <p>Objective #4: Standardize waterfront land use to ensure that future growth occurs in a planned and orderly manner.</p> <ul style="list-style-type: none"> The plan notes that a variety of growth tools may be appropriate for Lancaster County including performance standards, conservation easements, use valuation taxation, overlay zones, and open space provisions (that give flood control priority). 	
Northumberland County	<i>Floodplain Management (Chapter 76)</i>	May 11, 1989	<ul style="list-style-type: none"> Districts include areas subject to inundation by water of the on-hundred-year flood. Includes coastal floodplain areas. Sets out procedures for nonconforming uses. Sets design criteria for structures (including manufactured homes) in coastal floodplain areas. No land below the level of the one-hundred year tidal flood may be developed unless meets certain design criteria (in addition to other criteria for other floodplain areas). Sets design criteria for utilities and facilities. 	
Northumberland County	<i>Subdivision of Land (Chapter 128)</i>	July 1, 1972	<p>Article IV. General Regulations</p> <p>128-18. Building Site.</p> <p>A. To ensure that residents will have sufficient land upon</p>	

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			<p>which to build a house which is reasonably flood-free, the Agent may require the subdivider to provide elevation and flood profiles sufficient to demonstrate the land to be completely free of the danger of floodwaters.</p> <p>128-19. Improvements.</p> <p>H. Flood control and drainage. The subdivider shall provide, when requested, all information needed to determine what improvements are necessary to properly develop the subject property, including contour intervals, drainage plans and flood control devices.</p>	
Northumberland County	<i>Zoning (Chapter 148)</i>	September 1, 1974	<p><i>Article II. Conservation District C-1.</i></p> <p>148.5. Purpose. This district covers the portions of the county which are occupied by various open uses, such as forests, parks, farms, lakes, marshlands and wetlands subject to the Wetlands Board. This district is established for the specific purpose of facilitating existing and future farming operations, conservation of water and other natural resources, reducing soil erosion, protecting watersheds and reducing hazards from flood and fire.</p> <ul style="list-style-type: none"> • Uses generally restricted to single-family residential and other low-intensity uses. <p><i>Article III. Agricultural District A-1.</i></p> <p>148-17. Purpose. This district covers the portions of the county which are occupied by various open uses, such as forests, parks, or farms. This district is established for the specific purpose of facilitating existing and future farming operations, conservation of water and other natural</p>	Neutral

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			<p>resources, reducing soil erosion, protecting watersheds and reducing hazards from flood and fire. To ensure the success of the above goals, it is necessary to maintain as low a density of development as possible. The character of this district should remain agricultural in nature, with industry or commercial business allowed in it when it will benefit the area without degrading the environment.</p> <p><i>Article V. Residential Waterfront District R-3.</i> 148.42. Purpose. The purpose of this district is to protect the water and its shorelines of the country, by providing for safe and orderly shoreline development. In this district, residential, recreational, and conservancy uses are permitted and a limited number of commercial uses that would be compatible with the area.</p>	
Northumberland County	1996 Comprehensive Plan	October 10, 1996	<p><i>Chapter 2 – Issues, Goals, and Strategies</i> Physical and Environmental Issues <u>Use and Development of Land</u> Goal A: To provide a framework for managing future development of the County in a way that promotes opportunity for its citizens while directing growth to areas best able to accommodate growth.</p> <p>Strategy 2. Establish development guidelines designed to direct growth to areas with few or no physical constraints while promoting the preservation of...sensitive environmental areas.</p> <p>Goal C: To reduce the adverse impact of development on shorelines and sensitive environmental areas.</p>	Positive

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			<p>Strategy 2. Establish site planning guidelines for subdivisions along shorelines including how they interface with agricultural and forestry lands.</p> <p><u>Topographic Conditions that Limit Development</u></p> <p>Goal A: To reduce soil erosion on steep slopes particularly along creek and stream banks.</p> <p><u>Flood-Prone Areas</u></p> <p>Goal A: To promote maximum safety and to protect life and property from potential storm and flood damages.</p> <p>Strategy 1. Provide awareness and instructions to citizens advising of the potential dangers of establishing new buildings with flood-prone areas.</p> <p>Strategy 2. In cases where the use of flood-prone areas is acceptable, establish performance guidelines for new development within identified floodplains that limit the types of land uses that may be established in the floodplain.</p> <p>Strategy 3. Continue to administer the County's Floodplain Management Ordinance and review it from time to time to ensure that it is in conformity with the latest FEMA guidelines.</p> <p>Strategy 4. Continue to administer the County's Subdivision Ordinance and Soil and Erosion Control Ordinance to provide, where needed, flood control devices and other improvements necessary to protect property from flooding.</p> <p>Strategy 5. Avoid establishing wastewater disposal systems and utilities in or adjacent to areas subject to</p>	

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			<p>frequent flooding.</p> <p>Strategy 6. Raise the minimum level of the first floor of any building intended for human occupancy from zero (0) inches to no less than eight (8) inches above the 100-year floodplain.</p> <p><u>Soil Conditions</u></p> <p>Goal C. To reduce the amount of development on highly erodible soils, particularly where slopes are excessive.</p> <p>Strategy 2. Establish development policies that limit development on slopes greater than 15 percent and prevent development where slopes are 20 percent or greater.</p> <p>Strategy 3. Establish zoning and subdivision policies to provide incentives that encourage the use of innovative land planning techniques.</p> <p><u>Shoreline Conditions</u></p> <p>Goal A. To reduce the causes of shoreline erosion.</p> <p>Goal B. To promote the growth of marshes and other natural barriers to erosion.</p> <p>Goal C. To protect future buildings that may be constructed along shorelines which are vulnerable to extensive erosion.</p> <p>Strategy 2. Promote through incentives greater erosion protection along shorelines where the known rate of erosion is excessive.</p> <p>Strategy 3. Establish standards for construction which modify the shoreline, such as: bulkheads, piers, and boat houses.</p>	

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			<p>Strategy 4: Promote the use of vegetation as an alternate to construction for the control of shoreline erosion.</p> <p>Strategy 5: Continue to administer requirements of the Chesapeake Bay Resource Protection Area regulations...</p> <p><i>Chapter 3: Land Use Plan, Northumberland County</i></p> <ul style="list-style-type: none"> Sets forth policies for the Shoreline Conservation Area – focus on how new development can be accommodated while avoiding serious problem areas and protecting environmentally-sensitive areas. Recommended policies: b) New subdivisions shall be planned to minimize shoreline erosion resulting from construction and use of property. Shoreline erosion reduction measures that employ vegetation are preferred over structural features. <p><i>Chapter 5: Water Quality Protection Plan</i></p> <ul style="list-style-type: none"> Directs that development shall be done in such a way to preserve farmlands...and other environmentally-sensitive areas. Includes policies regarding development in areas with steep slopes. Addresses flood-prone areas with following policies: <ul style="list-style-type: none"> a) Residential subdivisions or other developments involving buildings designed for human occupancy shall not be established where any occupied floor area of a building is lower than eight (8) inches below the 100-year floodplain. Other uses not covered by RPA 	

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			<p>regulations that may be permitted within the floodplain shall be guided by the performance standards of FEMA.</p> <p>b) Point sources of pollution are not designed to be established in or designed so that they discharge waste into flood-prone areas.</p> <p>e) The 100-year flood zone...shall be identified on proposed plats or development plans.</p> <ul style="list-style-type: none"> • Addresses shoreline preservation – use of vegetation for shoreline protection and need for coordinated or subdivision wide actions. Suggests that the FEMA flood zones be incorporated into the zoning ordinance. • Implementation strategies: <ul style="list-style-type: none"> • 13.1 Preparation of guidelines for developing subdivisions involving shorelines can be incorporated in the Subdivision Ordinance. • 13.2 Require greater erosion protection along shorelines where the known rate of erosion is excessive. Such protection can be structural or regulatory. • 13.3 Establish standards for construction which modify the shoreline. • 13.4 Promote the use of vegetation as an alternate to construction for the control of shoreline erosion. • 13.5 Continue to administer requirements of the Chesapeake Bay Resource Protection Area regulations to preserve marshlands, wetlands, 	

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			and other sensitive environmental features from erosion or destruction.	
Richmond County	<i>Floodplain Ordinance</i>	March 9, 1989	<ul style="list-style-type: none"> • Applies to land within 100-year floodplain. • Special permit needed for all uses, activities, and development. • Manufactured homes within floodplain must be elevated and anchored to permanent foundation. • Sets design criteria for utilities and facilities. • Sets criteria for consideration of variances. • Sets procedures for existing structures. 	
Richmond County	<i>Subdivision Ordinance</i>		<p>Article IV. Design Standards</p> <p>Section 2. Suitability of Land Generally</p> <p>1. [A] subdivision...shall not be approved if it contains lots which are not suitable for residential occupancy for on the of the following reasons, ...may endanger the health, safety, property, and welfare of persons building and living on that lot or other properties:...a. steep slopes</p> <p>4. Wetlands...or any land subject to periodic flooding shall not be subdivided in such a way as to provide sites for residential occupancy nor for any other use which might involve danger to health, life or property, or aggravate the flood hazard...</p> <p>Section 5. Storm Water, Floodplain Management and Flood Protection</p> <p>Plats are to show floodplain delineations and drainage patterns.</p>	

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			<p>Section 6. Shoreline Protection and Waterfront Facilities 6. When shoreline stabilization is necessary, the design shall rely on nonstructural rather than structural methods in order to preserve natural shoreline vegetation. Bulkheading, riprap, retaining walls, and similar shoreline hardening methods should be avoided. Required shoreline stabilization shall be placed behind vegetated wetlands.</p> <p>Section 13. Planned Community Development 3. No more than 30 percent of the required minimum area of any lot shall be located in a floodplain area or wetland and no part of the area of any lot shall be covered by any body of water except that no more than 30 percent of the required minimum area of any lot may be covered by the waters of a lake, pond, or canal planned and approved as a part of and wholly within the subdivision or development.</p> <p>Article V. Required Improvements Section 11. Underground Utilities Where new electrical and telephone wires and cables are required for internal service to a subdivision, such wires and cables shall be placed underground...</p>	
Richmond County	<i>Manufactured Home Regulations Section of the Subdivision Ordinance</i>	May 11, 1989 and November 9, 1989 (amended)	<p>Section 3. Administration. 3-3. Mobile Homes Prohibited in Hurricane Zone. No mobile homes shall be located in any area in Richmond County designated as a “hurricane zone” unless such mobile home is brought up to current HUD standards for manufactured homes.</p>	

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Richmond County	<i>Zoning Ordinance</i>	November 9, 1995	<p>Article IV. General Design and Performance Standards.</p> <p>4-5 Underground Utilities</p> <p>Requires all utility facilities proposed within major plans of development to be located underground</p>	
Richmond County	<i>Richmond County, Virginia Comprehensive Plan</i>	March 20, 2001	<p><i>Part III – Goals, Issues, Objectives, and Recommendations</i></p> <p><u>Natural Resources and the Environment</u> - Goal: To protect the health, integrity, and value of the natural resources and environment of Richmond County.</p> <p>Objective 5: To protect major buildings from unavoidable shoreline erosion caused by major storms.</p> <p>Objective 9: To assure that major construction investments, particularly housing facilities, are not located in areas that may subject life and property to excessive peril resulting from periodic flooding during major storms.</p> <p>Recommendation 11: To administer requirements for stormwater management in all areas.</p> <p>Recommendation 21: To promote the development of shoreline protection strategies, at the subdivision stage, which are based upon the natural features of the waters, wetlands, and lands of individual shoreline reaches.</p> <p>Recommendation 23: To promote the use of natural vegetation for shoreline stabilization wherever practicable.</p> <p>Recommendation 38: Establish special setback regulations for residential and other structures where severe shoreline erosion has been</p>	

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			<p>documented and may represent a future threat to life and property.</p> <p>Recommendation 43: Continue to administer and enforce the County's Flood Plain Management Ordinance.</p> <p>Recommendation 44: Through zoning and other policies, avoid establishing public service facilities and utilities, such as wastewater disposal facilities, within or near any of the flood zones where they might create a hazard if damaged during a storm.</p> <p>Recommendation 48: Support volunteer and non-profit organizations, such as watershed specific planning groups in the education of the public regarding protection of the County's natural resources and environment.</p> <p><u>Land Use</u> – Goal: To accommodate future desirable development while maintaining the rural character of the County.</p> <p>Objective 7: Make reasonable use of the Rappahannock River and its tidal tributaries for recreational access while protecting existing habitat, wetlands, marshlands, and shorelines.</p> <p>Recommendation 7: The County should continue to regulate all development in the 100-year flood plain of rivers and streams in accordance with federal and state regulations.</p> <p>Recommendation 8: The County should continue to use open space requirements in the County's</p>	

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			<p>Subdivision Ordinance.</p> <p>Recommendation 12: Identify and acquire lands suitable for access to public water.</p> <p>Recommendation 13: Encourage cluster design techniques for development that concentrate buildings in specific areas of a site, in order to allow the remaining land to be used for open space recreation and preservation of environmentally sensitive features.</p> <p><u>Population Characteristics</u> – Goal: To expand the housing opportunities to all Richmond County citizens, but especially to those who are elderly or who live on low or moderate incomes.</p> <p>Recommendation 2: Develop County programs to encourage the maintenance of owner-occupied homes.</p> <p>Recommendation 3: Develop County programs to encourage the maintenance of renter-occupied homes.</p> <p>Recommendation 8: Study the implication that manufactured homes have on the local housing stock.</p> <p><i>Part V- Development and Policy Plan</i></p> <p>Elements of a Chesapeake Bay Preservation Plan – A Shoreline Management Strategy</p> <p>(3) Establish special setback regulations where shoreline erosion has been documented and because of periodic</p>	

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			<p>storms which may represent a future threat to life and property.</p> <p>Developing and Using the Land Within Physical Constraints</p> <p>(2) Through zoning and other policies, discourage the establishment of public service facilities and utilities, such as wastewater disposal facilities, within or near any of the flood zones where they might create a hazard if damaged during a storm.</p>	
Westmoreland County	<i>Residential Subdivision Ordinance</i>	June 1978	<p>Article VI - General Regulations</p> <p>6-3 Suitability of the Land. Land deemed by the Commission to be generally unsuitable and land subject to flooding shall not be subdivided (a) for residential occupancy unless sufficient land is provided in each lot to provide a building site free from flood or other danger, nor (b) for such other uses as may increase danger to health, life or property, or aggravate erosion or flood hazard. In this connection the Commission may require the subdivider to furnish topographical maps, elevations, flood profiles or other relevant data.</p>	Positive
Westmoreland County	<i>Westmoreland County, Virginia Zoning and Subdivision Ordinance Update: Preliminary Recommendations</i>	June 21, 2004 (submission date)	<p>Existing Article VII — Chesapeake Bay Regulations</p> <p>Recommendations:</p> <p>C. The designation of Resource Protection Areas (RPAs) and the specific features included in the RPA designation should be evaluated. Many localities have included steep slopes, major flood plains, and other environmentally sensitive features as Resource Protection Areas.</p>	Positive (if enacted)

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			Consideration should be given to the inclusion of these features as RPAs.	
Westmoreland County	<i>Zoning Ordinance of Westmoreland County, Virginia</i>	1971	<p>Article II. Districts</p> <p>2-2 Zoning District Classifications Generally.</p> <p><i>Conservation District (C-1):</i> area occupied by various open uses as forests, parks, lakes and marshes; is established to conserve water and natural resources, reduce soil erosion, preserve historical and wildlife areas, protect watersheds and reduce hazards from flood and fire.</p> <p>Article VI. General Provisions</p> <p>6-12 General Requirements -- Campgrounds, Manufactured home parks, and Travel Trailer Parks.</p> <p>(C) <i>Recreation Area.</i> At least ten percent of the gross park area, other than the 50 foot perimeter area, shall be designated and reserved for suitable recreational area. At least fifty percent of such areas shall be provided outside of any established floodplain.</p> <p>Article VII. Chesapeake Bay Preservation Area Overlay District</p> <p>7-5 Areas of Applicability.</p> <p>(2) The Resource Management Area is composed of concentrations of the following land categories: flood plains; highly erodible soils, including steep slopes; highly permeable soils; nontidal wetlands not included in the RPA; and other lands, including hydric soils, necessary to protect the quality of state waters. The Resource</p>	

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			<p>Management Area of Westmoreland County consists of all the lands in Westmoreland County which are not in the Resource Protection Area.</p> <ul style="list-style-type: none"> • Development in RMA may require water quality impact assessment before being approved 	
Westmoreland County	<i>Flood Management Ordinance Plain</i>	August 12, 1987	<ul style="list-style-type: none"> • Applies to all land identified as being flood-prone. Includes areas inundated by 100-year flood. • Permits are required for all uses. • Sets design criteria for utilities and water facilities. • Sets design criteria for building in coastal floodplain districts. • Requires manufactured homes within the “A” Zone to be elevated at or above BFE. • No land below the level of the one-hundred year tidal flood may be developed unless meets certain design criteria. 	
Westmoreland County	<i>Westmoreland County General Plan</i>	Undated – 1999?	<p><i>Natural Resources</i></p> <p>Goals: Minimal effects of high water flooding are experienced due to appropriate development practices, land use controls and protection of vulnerable shoreline and drainage conditions are improved where practical.</p> <p>Objective: Discourage improper development of flood plains through proper land use controls</p> <p>Objective: Monitor changes to the shoreline in an attempt to minimize property damage and loss of life and call upon the appropriate State and Federal agencies to mitigate problems as they occur.</p>	

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			<p>Objective: Encourage private landowners to maintain drainage ditches in the best possible condition.</p> <p>Objective: Improve the County's flood insurance program rating.</p> <p>Strategy: Continue to develop and enforce zoning regulations and other County ordinances that ensure the conservation of...flood plains... and other environmentally sensitive areas and resources.</p> <p>Strategy: Maintain noted problem ditches to alleviate flooding of roadways and property in cooperation with the Virginia Department of Transportation and private landowners.</p> <p>Strategy: Complete a comprehensive drainage study of the County as an initial step in implementing practical measures to improve the County's flood insurance program rating.</p> <p>Strategy: Complete a comprehensive study that addresses the effects of piers, groins, rip-rap, bulkheads and other shoreline erosion control and property improvement projects on the erosion and accretion of soils and sands.</p> <p><i>Community Facilities and Services</i></p> <p>Strategy: Apply acceptable zoning, land use, and other adopted County criteria when evaluating public facility sites.</p> <p>Strategy: Investigate the need to establish a</p>	

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Jurisdiction	Plan Name	Date Adopted	Excerpts/Details of Document	Effect?
			<p>Grants and Volunteer Services Committee to formally pursue grant and loan opportunities.</p> <p><i>Housing</i></p> <p>Objectives: Encourage the maintenance and renovation of existing dwelling units.</p> <p>Strategy: Conduct a study of the state of Manufactured Homes in the County which addresses the following:</p> <ul style="list-style-type: none"> - The extent of scattered, substandard, or otherwise blighted manufactured homes <p><i>Land Use</i></p> <ul style="list-style-type: none"> • The plan notes that the Land Use administration will work with the Parks and Recreation Department to coordinate easements – floodplains or other hazardous sites not specifically mentioned but easements could be used to prevent development in these areas. <p>General Land Use Standards #6: Protect environmentally sensitive resources such as steep slopes, ...wetlands...other sensitive resources by locating conflicting uses away from such resources and utilizing design features, including building and site design, buffers and screening to adequately protect the resource.</p> <p>General Land Use Standards #8: Provide underground utilities in new developments, including new line extensions and major improvements to existing lines.</p>	

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Jurisdiction	Plan Name	Date Adopted	Excerpts/Details of Document	Effect?
			<p>Residential Land Use Standards #3: Preserve sensitive areas as open space, maintain trees and vegetation...</p> <p>Residential Land Use Standards #4: Base design on a rational use of land reflecting topographic and other physical features and natural boundaries of the site rather than imposing a rectilinear layout intended to solely to satisfy minimum ordinance requirements.</p> <p>Stormwater Management Standards: multiple but none that address flood control directly</p> <p><i>Future Land Use Plan</i></p> <ul style="list-style-type: none"> Conservation land use designation: protection, preservation, and conservation of the County's living marine environment and its natural resources through limited land use and development. Includes land with slope greater than 25%, flood hazard areas. Areas are intended to remain in their natural state. Preferred land uses include hunting and fishing clubs, fish and game preserves, passive recreational facilities, parks, and other open space that complements the natural environment. 	
Region	<i>Northern Neck Regional Emergency Operations Plan</i>	December 2003	<p><i>Functional Annex GG: Hazard Mitigation</i></p> <ul style="list-style-type: none"> Delineates responsibilities for Coordinator of Emergency Services, County departments/agencies, volunteer organizations, private businesses and citizens. States that mitigations measures should "include, but are not limited to, the development of zoning laws and 	

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Jurisdiction	Plan Name	Date Adopted	Excerpts/Details of Document	Effect?
			land use ordinances, building codes, regulations, and licensing for handling and storage of hazardous materials, and the inspection and enforcement of such ordinances, codes, and regulations.” <ul style="list-style-type: none">• Recommends a public information campaign.	

Appendix C – Guide to Mitigation Strategies²

Mitigation strategies or activities fall into six general categories. These categories are explained in the next section. The second and third sections provide more detail on common mitigation activities.

I. General Categories

Prevention

Preventative activities are intended to keep hazard problems from getting worse. They are particularly effective in reducing a community's future vulnerability, especially in areas where development has not occurred or capital improvements have not been substantial. Examples of preventative activities include:

- Open space preservation
- Storm water management
- Drainage system maintenance
- Shoreline / riverine setbacks
- Capital Improvement Plans/critical facility placement
- Special assessment districts

Local land use plans and ordinances can be used to limit development in hazard-prone areas or to prevent problems from getting worse. Examples of local enforcement tools that can be used include:

- Planning and zoning
- Floodplain regulations

Property Protection

Property protection measures protect new or existing structures by modifying the building to withstand hazardous events, or removing structures from hazardous locations. Examples include:

² This appendix is based, in part, on the City of Chesapeake (VA) Hazard Mitigation Plan. Portions of this document also were drawn from the *Tools and Techniques: An Encyclopedia of Strategies to Mitigate the Impact of Natural Hazards* developed by the State of North Carolina in 2002, and the *Planning for Natural Hazards: Oregon Technical Resource Guide* developed by the Oregon Natural Hazards Workgroup, Community Service Center at the University of Oregon.

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- Acquisition
- Relocation
- Building elevation
- Critical facilities protection
- Building codes (enforcement)
- Safe rooms
- Basement backflow prevention
- Retrofitting (i.e., windproofing, floodproofing, seismic design standards, etc.)
- Wind shutters

Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their mitigation functions. Such areas include floodplains, wetlands, and dunes. Parks, recreation, or conservation agencies, and organizations often implement these measures. Examples include:

- Floodplain protection
- Riparian buffers
- Vegetative planting and treatment / slope stabilization / fire-resistant landscaping
- Fuel breaks
- Wetland preservation and restoration

Structural Projects

Structural mitigation projects are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event. They are usually designed by engineers and managed or maintained by public works staff. Examples include:

- Channel modification
- Levees / dikes / floodwalls
- Diversions / detention / retention
- Reservoirs
- Utility protection / upgrades
- Wind retrofitting / windproofing

Emergency Services

Although not typically considered a “mitigation technique,” emergency service measures do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event. Examples include:

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- Warning systems
- Evacuation planning and management
- Sandbagging for flood protection

Public Information and Awareness

Public information and awareness activities are used to advise residents, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property. Examples of measures to educate and inform the public include:

- Speaker series / demonstration events
- Hazard map information
- Real estate disclosure
- Library materials
- School children education
- Hazard expositions
- Websites

II. General Multi-Hazard Mitigation Activities

The following potential mitigation activities can be used to address one or more hazards. These activities also can benefit a community's overall hazard reduction efforts. Activities that are specific to a particular hazard are explained in the third section.

The mitigation activities selected should be linked to the Planning District's goals and objectives, and must address each jurisdiction's hazard risks and vulnerability outlined in the plan's Hazard Identification and Risk Assessment.

Building Codes

Building codes regulate the design, construction, and maintenance of construction within most communities. These regulations prescribe standards and requirements for occupancy, maintenance, operation, construction, use, and appearance of buildings. Building codes are an effective way to ensure that new and extensive re-development projects are built to resist natural hazards. In Virginia, communities are required by law to adopt and enforce the Uniform Statewide Building Code, which has provisions for wind, water, and seismicity. Changes to the code are made by petitioning the International Code Council.

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The USBC provides optional enforcement regulations to protect occupants of existing buildings and structures from health and safety hazards arising from the improper maintenance and use of those buildings and structures. Enforcement of the building code for new and existing structures is key to realizing the full health and safety benefits of the code.

Capital Improvement Plans/Critical Facility Placement

Capital improvement plans typically provide for the future and ongoing provision of public facilities and infrastructure. These plans can be vital tools in keeping new development out of high-hazard areas by limiting the availability of public infrastructure. Public facilities can often be relocated to less hazardous areas in the aftermath of a disaster. Public utilities also can be relocated, or they can be upgraded or floodproofed. Power and telephone lines can be buried underground.

In order to maximize the gravity flow area of wastewater treatment plants, the facilities are often located at the lowest elevation in the community. If this point lies within a floodplain for example, consideration may be given to relocating or floodproofing such facilities. New locations for critical facilities should not be in hazard-prone areas, or in areas where their function may be impaired by a given hazard event (i.e., where water can flood the access roads). Critical facilities should be designed and/or retrofitted in order to remain functional and safe before, during, and after a hazard event.

Comprehensive Plans

Comprehensive plans address how and where a community should grow by guiding the rate, intensity, form, and quality of physical development. These plans address land use, economic development, transportation, recreation, environmental protection, the provision of infrastructure, and other municipal functions. Comprehensive plans help to guide other local measures such as capital improvement programs, zoning ordinances, subdivision ordinances and other community policies and programs. By including natural hazard considerations into the plan, mitigation become integrated with community functions and could therefore be an institutionalized part of a jurisdiction's planning efforts.

Density and development patterns should reflect the Planning District communities' ability to protect their jurisdictions, the environment, and the ability to evacuate the area. Development management tools should be incorporated into the local policies that address the location, density, and use of land, with a particular emphasis on

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development within high-risk areas. Efforts should be made to keep people and property out of high-hazard areas whenever possible. Particularly hazardous areas could be used for recreational uses, open space, or wildlife refuges.

Critical Facilities Protection

Critical facilities, such as hospitals, fire and police stations, and sewage treatment plants are crucial for day-to-day survival of a community. Ensuring that these facilities have been built to withstand the impacts of natural disasters is crucial. This includes placement of the buildings in areas that are not hazard-prone and incorporating mitigation measures such as floodproofing, wind shutters, and hurricane straps into the construction of the building.

Evacuation Planning and Management

An orderly and safe evacuation requires planning and a pre-determined management strategy. This includes pre-identifying emergency evacuation routes and communicating that information to the public. In addition, people needing assistance, such as the elderly or those with special needs, should be identified and plans made to assist them if an evacuation were to occur.

Another component of evacuation planning is ensuring that shelter facilities will be available. Potential shelter locations must be identified and publicized and efforts must be made to ensure that the proper supplies and staff are available if the shelter is activated.

Neighborhood Access

Provide additional means of access into single-entry neighborhoods, in order to prevent residents from becoming trapped in a hazardous area during a wildfire or flood.

Public Outreach and Education Programs

Educating the public about what actions they can take to protect themselves and their property from the effects of natural hazards can be an effective means for reducing losses. These types of programs could target public officials, citizens, businesses, or the local construction trade. The program could cover preparedness, recovery, mitigation, and general hazard awareness information. Potential outreach and education topics include:

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- Flood insurance
- Hazard mitigation for homeowners (including manufactured homes and trailers), renters, and businesses
- Emergency preparedness for families, businesses, and special needs populations
- Driver safety in disasters
- Sheltering and evacuation

Ways of delivering this information include:

- Speaker series / demonstration events
- Hazard expositions
- Hazard curriculums for schools
- Hazard map dissemination
- Real estate disclosure
- Library materials
- Websites

Special Assessment Districts

Special assessment districts apply to property owners who directly benefit from a specific public improvement. These owners of both new and existing development in the district are charged a fee that is proportional to the benefits received from the improvement. There are a number of ways to apply this technique, from temporary assessments that raise revenue for a specific improvement to indefinite assessments that fund independent, special purpose governmental entities. The former could be used to fund structural projects, such as a floodwall, while the latter could be used to establish a regional floodplain management organization.

Another example might be the creation of a “special storm services” district, where funds would go toward mitigation, recovery and response activities. In other cases, the fee could be used to pay for the upkeep of stormwater management system or as a way of providing for the future replacement of roads and utilities at the public expense. These charges may or may not have the effect of discouraging development in the assessment district. However, they do transfer some of the cost of living or doing business in a hazard-prone area to those who choose to do so.

Utility Protection/Upgrading

Buried power lines can offer uninterrupted power during and after severe storms (both wind and winter storms). Burying power lines can significantly enhance a community’s ability to recover in the aftermath of a disaster. Buried power lines are typically more expensive to maintain and are more vulnerable to flooding.

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Encouraging back-up power resources in areas where burial is not feasible will enable the continuity of basic operations (e.g., security, refrigeration, and heat) for businesses and facilities when there is a loss of power.

Vegetative Maintenance

Vegetative maintenance is the pruning and maintenance of trees, bushes, and other vegetation that could increase threats to power lines during storms, or could act as fuels during wildfires. This could be applied in limited areas that have a significant vulnerability to these hazards, such as within utility easements or along the urban-wildland interface.

Vegetative Planting and Treatment/ Fire-resistant landscaping

Vegetative planting and treatments can help to capture and filter runoff or reduce wildfire risk depending on the types of plants used. Perennial vegetation includes grass, trees, and shrubs that cover the soil, reduce water pollution, slow the rate of runoff, increase filtration, and prevent erosion. This type of land treatment includes maintaining trees, shrubberies, and the vegetative cover; terracing (i.e., a raised bank of earth with vertical sloping sides and a flat top to reduce surface runoff); stabilizing slopes; grass filter strips; contour plowing; and strip farming (i.e., the growing of crops in rows along a contour). Other potential options include vegetated swales, infiltration ditches, and permeable paving blocks.

Landscaping also make a difference in the vulnerability of a property to wildfire. Using plant materials that are less

Warning Systems

Warning systems are comprised of two components: monitoring of local conditions and the broadcasting of alerts. An example of monitoring is a system of stream gauges that provide real-time data.

The National Weather Service uses broadcasts via NOAA Weather Radio to alert communities of meteorological events such as floods and tornadoes. Reverse 911 systems and the media (e.g., television, radio) also can be used to alert residents to hazardous situations.

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Zoning

Zoning is by far the most common land use control technique used by local governments. While a useful tool for regulating and restricting undesirable land uses, zoning has a somewhat more limited benefit when it comes to mitigation. Zoning is most effective on new development rather than existing development, which does little to address the pre-existing development in hazardous areas. Communities with a large amount of undeveloped land will benefit much more than older, more established communities.

A community might create an overlay zone for high-hazard districts that establishes mitigation requirements for development in those districts. Overlays are also useful for periods of reconstruction. A recovery overlay zone would include temporary planning regulations that might strictly limit reconstruction in the hazard area or could require any new development to include hazard mitigation techniques. The overlay zone would remain transparent until it was triggered by a disaster event.

Even for new development, the issuance of variances, special use permits, rezoning, and the failure to enforce existing codes, however, will weaken zoning's ability to prevent certain types of building practices.

III. Hazard-Specific Activities

The following is a list of potential mitigation activities that are hazard-specific.

Flood

Flood mitigation measures can be classified as structural or non-structural. In simple terms, structural mitigation attempts to eliminate the possibility of flooding at a particular location. Non-structural mitigation removes the potentially affected people or property from the potentially flooded area. The following is a description of potential flood mitigation measures.

Floodplain Management Ordinances

Floodplain management addresses the hazard risk of communities partially or entirely located in a floodplain. Floodplain management ordinances should restrict development that would increase flood heights and ensure that construction materials and methods used will minimize future flood damage.

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Floodplain management ordinances are weakened by development pressures, a lack of suitable sites outside of the floodplain, community desires to be near the water, inability to effectively monitor floodplain management activities, or by land use planning policies that are encouraging development into floodplain areas.

Acquisition

Acquisition involves the purchasing of property in a hazardous area, which is subsequently cleared and permanently held as open space. Acquisition permanently moves people and property out of harm's way, increases floodplain capacities, recreation areas and open space, and can help to preserve wetlands, forests, estuaries and other natural habitats. Participation in federally-funded grant programs requires voluntary participation by the owner.

Acquisition programs can be expensive to undertake, and the property will no longer accrue taxes for the community and must be maintained, but it is by far the most effective and permanent mitigation technique. Acquisition is most effective when targeting repetitive loss structures, extremely vulnerable structures, or other high-hazard areas.

Basement Backflow Prevention

Check valves, sump pumps, and backflow prevention devices in homes and buildings can be used to prevent flooding in basements from sewer backflows. This option can be done only if the infrastructure allows it.

Channel Modification

Changes to the stream bed, such as dredging or lining the channel, can improve the flow and capacity of the stream. By improving the ability of the stream to move surplus water, the flood risk can be reduced. Channelization projects are designed to move water quickly away from developed areas.

Dry Floodproofing

Dry floodproofing involves making all areas below the flood protection level watertight by strengthening walls, sealing openings, using waterproof compounds, or applying plastic sheeting on the walls. This method is not recommended for residential structures, but may work well for new construction, retrofitting, or repairing a non-residential structure. Due to pressure exerted on walls and floors by

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floodwater, dry floodproofing is effective on depths less than 2 to 3 feet. Floodproofing of basements is not recommended.

Elevation

Elevation is the raising of a structure above the Base Flood Elevation. Elevation is often the best alternative for structures that must be built or remain in flood-prone areas, and is less costly than acquisition or relocation. However, elevating a structure can increase its vulnerability to high winds and earthquakes. Some building types are either unsuitable or cost-prohibitive to elevate.

Open Space Preservation

Local government can purchase land to prevent development from occurring in hazard-prone areas. Land can be bought through fee simple purchase or conservation easements could be sought. The land can be used as community open space or for recreational purposes, potentially meeting other community goals.

Relocation

Relocation involves the moving of a building or facility to a less hazardous area, on either the same parcel or another parcel. This measure also moves people and property out of harm's way, and is a very effective measure overall. Some building types are either unsuitable or cost-prohibitive to relocate.

Reservoirs

Reservoirs can be used to store water for various purposes including municipal water sources, recreational uses, and flood control. Water can be stored and released at a controlled rate so as not to overwhelm the downstream channel.

Riparian Buffers

Riparian buffers prevent development within a certain distance from a stream or river. The buffer typically retains its natural vegetation that often can retain greater amounts of water than bare soil and thus help to mitigate flood level. The plant roots hold soil in place and slow movement of floodwaters, lessening erosion and sedimentation, while increasing groundwater infiltration. This increased groundwater infiltration may also improve water quality by reducing the amount of sediment and pollutants flowing into the stream.

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Sandbagging

“Sandbags can be used to fill gaps in a permanent protection system, to raise an existing levee or to build a complete emergency levee. Sandbags alone, when filled and stacked properly, can hold back flood water, but they are most effective when used with polyethylene (plastic) sheeting.”³

Shoreline / Riverine Setbacks

Setbacks establish a minimum distance between an existing shoreline or stream/river and the buildable portion of a lot. By moving the building away from a potential hazard, the risk to the building is reduced. Setbacks also may be used to move development away from steep slopes that are at risk for failure (e.g., landslide).

Stormwater Management / Storm Drainage Systems / Retention and Detention Facilities

New development that increases the amount of impervious surfaces affects the land’s ability to absorb the water and can intensify the volume of peak flow runoff. Without efficient stormwater management, runoff could cause flooding, erosion, and water quality problems. Stormwater management plans should incorporate both structural and nonstructural measures in order to be most effective.

Mitigation efforts include the installation, re-routing, or increasing the capacity of storm drainage systems. Examples include the separation of storm and sanitary sewers or drainage easements. Other structural measures include retention and detention facilities that minimize the increase of runoff due to impervious surfaces and new development. Retention facilities allow stormwater to seep into the groundwater. Detention systems accumulate water during peak runoff periods that will be released at off-peak times. Nonstructural measures include establishing impervious surface limit policies and maintenance programs for existing drainage systems.

Stream/Channel Maintenance

Waterways should be cleared of debris to allow for the free flow of water during a flood event. If streams or rivers are clogged with debris, damming could occur. As a result, areas upstream and adjacent to the unintended dam can receive unanticipated

³ *Using Sandbags for Flood Protection*. Retrieved from <http://www.louisianafloods.org/Mitigation/sandbagsmain3.html> on December 20, 2004.

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higher flood levels. In addition, downstream areas may be vulnerable to higher flooding if and when the dam breaks.

Structural Flood Control Measures

Water can be channeled away from people and property with structural control measures such as levees, dams, or floodwalls. These measures also may increase drainage and absorption capacities. These structural control measures also may increase Base Flood Elevations and could create a false sense of security.

Wet Floodproofing

The opposite of dry floodproofing, wet floodproofing lets the floodwater actually enter a structure. This technique is effective on deeper flood depths, as it does not have the same potential to build up exterior pressure. Again, this method is not recommended for residential structures and may not be used for basements under new construction, substantial improvements, or substantially damaged structures.

Wetland Preservation and Restoration

Wetlands can store floodwaters and decrease overall flow downstream, thereby reducing the flood risk. Wetlands also act as filters for pollutants, therefore, increasing water quality. Its usefulness as a mitigation technique may decrease with the size of the flood.

Wind

Proper engineering and design of a structure can increase a structure's ability to withstand the lateral and uplift forces of wind. Building techniques that provide a continuous load path from the roof of the structure to the foundation are generally recommended.

Community Shelters/Safe Rooms

Community shelters and concrete safe rooms can offer protection and reduce the risk to life. Locations for these shelters or safe rooms are usually in concrete buildings such as shopping malls or schools. Communities lacking basements and other protection nearby should consider developing tornado shelters.

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Windproofing

Windproofing is the modification of the design and construction of a building to resist damages from wind events, and can help to protect the building's occupants from broken glass and debris. Windproofing involves the consideration of aerodynamics, materials, and the use of external features such as storm shutters. These modifications could be integrated into the design and construction of a new structure or applied to reinforce an existing structure.

Manufactured homes, which tend to be vulnerable to the effects of extreme wind events, can be protected by anchoring the structures to their foundations. Mobile homes could be tied down to their pads in order to prevent them from being destroyed. Public facilities, critical infrastructure, and public infrastructure (such as signage and traffic signals) should all be windproofed in vulnerable areas. However, windproofing is not a viable mitigation technique to protect against tornadoes.

Wind Shutters

Wind or hurricane shutters can reduce the damages from high winds by preventing windows from breaking allowing wind and rain to enter a structure. Shutters come in various materials and can be purchased or built from scratch.

Wildfire

Fuel Breaks

Fuel breaks are used to prevent the spread of a wildfire. Fuel breaks are areas where vegetation and other fuels have been cleared. Roads and driveways can act as fuel breaks.

APPENDIX D – FREQUENTLY USED MITIGATION TERMS AND ACRONYM LIST

Frequently Used Mitigation Terms

Acquisition of Hazard-Prone Structures	Local governments can acquire lands in high hazard areas through conservation easements, purchase of development rights, or outright purchase of property.
Base Flood Elevation (BFE)	Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as a standard for the National Flood Insurance Program.
Benefit	Net project outcomes, usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of conducting a benefit cost analysis of proposed mitigation measures, benefits are limited to specific, measurable risk reduction factors, including a reduction in expected property losses (building, contents, and function) and protection of human life.
Benefit-Cost Analysis (BCA)	A systematic, quantitative method of comparing the projected benefits to projected costs of a project or policy. It is used as a measure of cost-effectiveness.
Capability Assessment	An assessment that provides a description and analysis of a community or state's current capacity to address the threats associated with hazards. The capability assessment attempts to identify and evaluate existing policies, regulations, programs, and practices that positively or negatively affect the community or state's vulnerability to hazards or specific threats.
Community Rating System (CRS)	CRS is a program that provides incentives for National Flood Insurance Program communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of these policyholders in communities are reduced.
Cost-Effectiveness	Cost-effectiveness is a key evaluation criterion for federal grant programs. Cost-effectiveness has several possible definitions, although for grant making purposes FEMA defines a cost-effective project as one whose long-term benefits exceed its costs. That is, a project should prevent more expected damages than it costs initially to fund the effort. This is done to ensure that limited public funds are used in the most efficient manner possible.

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	Benefit-cost analysis is one way to illustrate that a project is cost-effective.
Critical Facilities	Facilities vital to the health, safety, and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.
Debris	The scattered remains of assets broken or destroyed in a hazard event. Debris transported by a wind or water hazard event can cause additional damage to other assets.
Disaster Mitigation Act of 2000 (DMA 2000)	DMA 2000 (Public Law 106-390) is the latest legislation to improve the planning process. Signed into law on October 30, 2000, this legislation reinforces the importance of mitigation planning and emphasizes planning for disasters before they occur.
Displacement Time	The average time (in days) which the building's occupants typically must operate from a temporary location while repairs are made to the original building due to damages resulting from a hazard event.
Elevation of Structures	Raising structures above the base flood elevation to protect structures located in areas prone to flooding.
Erosion	Wearing away of the land surface by detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.
Essential Facility	Elements that are important to ensure a full recovery of a community or state following a hazard event. These would include government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.
Federal Emergency Management Agency (FEMA)	Agency created in 1979 to provide a single point of accountability for all federal activities related to disaster mitigation and emergency preparedness, response, and recovery. FEMA is now part of the Department of Homeland Security.
Flash Flood	A flood event occurring with little or no warning where water levels rise at an extremely fast rate.
Flood	A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or

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	runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.
Flood Depth	Height of the flood water surface above the ground surface.
Flood Elevation	Elevation of the water surface above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or Mean Sea Level.
Flood Hazard Area	The area on a map shown to be inundated by a flood of a given magnitude.
Flood Insurance Rate Map (FIRM)	Map of a community, prepared by the Federal Emergency Management Agency that shows both the special flood hazard areas and the risk premium zones applicable to the community.
Flood Insurance Study (FIS)	A study that provides an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations in a community or communities.
Flood Mitigation Assistance (FMA) Program	A program created as part of the National Flood Insurance Reform Act of 1994. FMA provides funding to assist communities and states in implementing actions that reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other NFIP insurable structures, with a focus on repetitive loss properties.
Floodplain	Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.
Floodproofing	Actions that prevent or minimize future flood damage. Making the areas below the anticipated flood level watertight (dry floodproofing) or intentionally allowing floodwaters to enter the interior to equalize flood pressures are examples of flood-proofing (wet floodproofing).
Flood Zone	A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.
Frequency	A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on

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	the kind of hazard being considered.
Functional Downtime	The average time (in days) during which a function (business or service) is unable to provide its services due to a hazard event.
Geographic Information Systems (GIS)	A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.
Goals	General guidelines that explain what you want to achieve. They are usually broad policy-type statements, long term in nature, and represent global visions.
Hazard	A source of potential danger or adverse condition. Hazards include naturally occurring events such as floods, earthquakes, tornadoes, tsunami, coastal storms, landslides, and wildfires that strike populated areas and has the potential to harm people or property.
Hazard Event	A specific occurrence of a particular type of hazard.
Hazard Identification	The process of identifying hazards that threaten an area.
Hazard Information Center	Information booth, publication kiosk, exhibit, etc. that displays information to educate the public about hazards that affect the jurisdiction and hazard mitigation activities people can undertake.
Hazard Mitigation	Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.
Hazard Mitigation Grant Program (HMGP)	Authorized under Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.
Hazard Profile	A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.
Hurricane	An intense tropical cyclone, formed in the atmosphere over warm ocean seas, in which wind speeds reach 74-miles-per-hour or more and blow in large spiral around a relatively calm center or "eye". Hurricanes develop over the north Atlantic Ocean, northeast Pacific Ocean, or the south Pacific Ocean east of 160°E longitude.

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	Hurricane circulation is counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere.
Hydrology	The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.
Infrastructure	Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treatment facilities, and transportation systems such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, dry docks, piers and regional dams.
Landslide	Downward movement of a slope and materials under the force of gravity.
Loss Estimation	Forecasts of human and economic impacts and property damage from future hazard events, based on current scientific and engineering knowledge.
Lowest Floor	Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure.
Magnitude	A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.
Mitigate	To cause something to become less harsh or hostile: to make less severe or painful.
Mitigation Actions	Activities or projects that help achieve the goals and objectives of a mitigation plan.
Mitigation Plan	The document that articulates results from the systematic process of identifying hazards and evaluating vulnerability, identifying goals, objectives, and actions to reduce or eliminate the effects of identified hazards, and an implementation plan for carrying out the actions.
National Flood Insurance Program (NFIP)	Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3.
National Weather Service	Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to Federal and state

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(NWS)	entities in preparing weather and flood warning plans.
Nor'easter	An extra-tropical cyclone producing gale-force winds and precipitation in the form of heavy snow or rain.
Objectives	Objectives define strategies or implementation steps to attain the identified goals. Unlike goals, objectives are specific and measurable.
Open Space Preservation	Preserving undeveloped areas from development through any number of methods, including low-density zoning, open space zoning, easements, or public or private acquisition. Open space preservation is a technique that can be used to prevent flood damage in flood-prone areas, land failures on steep slopes or liquefaction-prone soils, and can enhance the natural and beneficial functions of floodplains.
Post-Disaster Recovery Planning	The process of planning those steps the jurisdiction will take to implement long-term reconstruction with a primary goal of mitigating its exposure to future hazards. The post-disaster recovery planning process can also involve coordination with other types of plans and agencies, but it is distinct from planning for emergency operations.
Probability	A statistical measure of the likelihood that a hazard event will occur.
Public Education and Outreach Programs	Any campaign to make the public more aware of hazard mitigation and mitigation programs, including hazard information centers, mailings, public meetings, etc.
Regulation	Most states have granted local jurisdictions broad regulatory powers to enable the enactment and enforcement of ordinances that deal with public health, safety, and welfare. These include building codes, building inspections, zoning, floodplain and subdivision ordinances, and growth management initiatives.
Recurrence Interval	The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.
Relocation Out of Hazard Areas	A mitigation technique that features the process of demolishing or moving a building to a new location outside the hazard area.
Repetitive Loss Property	A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least \$1,000 each have been paid within any 10-

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year period since 1978.

Replacement Value	The cost of rebuilding a structure. This is usually expressed in terms of cost per square foot, and reflects the present-day cost of labor and materials to construct a building of a particular size, type and quality. This is not the same as market value.
Resources	Resources include the people, materials, technologies, money, etc., required to implement strategies or processes. The costs of these resources are often included in a budget.
Risk	The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.
Special Flood Hazard Area (SFHA)	An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year (100-year floodplain); represented on Flood Insurance Rate Maps by darkly shaded areas with zone designations that include the letter A or V.
Stafford Act	The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs.
Stakeholders	Individuals or groups, including businesses, private organizations, and citizens, that will be affected in any way by an action or policy.
State Hazard Mitigation Officer (SHMO)	The representative of state government who is the primary point of contact with FEMA, other state and Federal agencies, and local units of government in the planning and implementation of pre- and post disaster mitigation activities.
Storm Surge	Rise in the water surface above normal water level on the open coast due to the action of wind stress and atmospheric pressure on the water surface.
Structural Retrofitting	Modifying existing buildings and infrastructure to protect them from hazards.
Subdivision and Development	Regulations and standards governing the division of land for

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Regulations	development or sale. Subdivision regulations can control the configuration of parcels, set standards for developer-built infrastructure, and set standards for minimizing runoff, impervious surfaces, and sediment during development. They can be used to minimize exposure of buildings and infrastructure to hazards.
Tornado	A violently rotating column of air extending from a thunderstorm to the ground.
Tropical Cyclone	A generic term for a cyclonic, low-pressure system over tropical or subtropical waters.
Tropical Depression	A tropical cyclone with maximum sustained winds of less than 39 mph.
Tropical Storm	A tropical cyclone with maximum sustained winds greater than 39 mph and less than 74 mph.
Vulnerability	Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.
Vulnerability Assessment	The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.
Zoning Ordinance	Designation of allowable land use and intensities for a local jurisdiction. Zoning ordinances consist of two components: a zoning text and a zoning map.

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Acronym List

BFE – Base Flood Elevation

CRS – Community Rating System

DMA 2000 – Disaster Mitigation Act of 2000

DOF – Virginia Department of Forestry

FEMA – Federal Emergency Management Agency

FIRM – Flood Insurance Rate Map

FIS – Flood Insurance Study

GIS – Geographical Information System

HIRA – Hazard Identification Risk Assessment

HMGP – Hazard Mitigation Grant Program

LEPC – Local Emergency Planning Committee

MAC – Mitigation Advisory Committee

NFIP – National Flood Insurance Program

NHC – National Hurricane Center

NNPDC – Northern Neck Planning District Commission

NOAA – National Oceanic Atmospheric Administration

NWS – National Weather Service

PRISM – Parameter-elevation Regressions on Independent Slopes Model

SCAS – Spatial Climate Analysis Service

STAPLE/E – Social, Technical, Administrative, Political, Legal, Economic and Environmental

USDA – United States Department of Agriculture

USGS – United States Geological Survey

VDEM – Virginia Department of Emergency Management